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Title	Unintentional injuries in children and youth from immigrant families in Ontario, Canada: a population-based cross-sectional study
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Reviewer 1	Ivan Pless
Institution	Montreal Childrens Hospital, Community Pediatric Research
General comments (author response in bold)	<p>This is a well-executed, well written, and interesting paper. It is also perplexing. I list several areas listed below that need correction or clarification.</p> <p>1. But the key issue that concerns me is the need for a better explanation – even speculation - for the unexpected finding that immigrants had lower rates of injury than native Canadians. This is entirely counterintuitive given the social status of most immigrants. I can imagine a wave of privately sponsored immigrants being wealthier than other Canadians but that does not seem to be the case for the sample in this study. Thank you. This finding was not entirely unexpected for our team, given the well described healthy immigrant effect in adult populations and our previous study on all-cause visits to the Emergency Room by children showing a lower proportion of visits for injury in immigrant children (Saunders et al. J Peds, 2016), however, we appreciate that awareness of the 'healthy immigrant effect' is not necessarily widespread. We have added in a sentence about our previous study to support the notion that injury rates may be lower in immigrant children and we have introduced the notion of the 'healthy immigrant effect' our introduction.</p> <p>Minor points:</p> <p>2. The sentence concluding the Background in the Abstract spells out the objective but it needs to be more precise and it differs from what is written later. It appears that the authors had a reason to suspect the relationship would be opposite to what we would expect and predict but this comes out of the blue. As mentioned above, we have now added information to support our hypothesis in the introduction. This includes information on the healthy immigrant effect as well as on our previously published data.</p> <p>3. I am not certain that the use of Poisson to estimate risk ratios is appropriate in a cross sectional study. I suggest a statistician be consulted. My concern is that I wonder why we can assume that the dependent variables (injury rates) have a poisson distribution. This has been addressed in more detail in response to the editor comments in #8 above. Specifically, however, injuries in this study are a count and are not time dependent and therefore a Poisson model is appropriate.</p> <p>4. It is not evident what group the Annualized injury rates described in the first line of the Results applies to. In the third sentence we are told the immigrants have the lowest risk of injury but we are not told which level of injury – ED, hospitalization, or death. The first line of the results does not describe injury rates, instead, it describes the number of immigrants and non-immigrants included in each cohort year. Does this reviewer mean the last line? If so, it is referring to the overall rates of the entire cohort, as it is written. The third sentence does not mention that immigrants have the lowest risk of injury. Perhaps this reviewer's comment could be clarified and we could address it.</p> <p>5. The interpretation referring to the results 'supporting a healthy immigrant effect' (HIE) implies first that this was what was suspected and second that readers will know what the HIE refers to. It needs to be specified in the Background or Methods. Thank you. This has been added to the Background section and referenced.</p> <p>6. Background – I do not understand the second sentence beginning "While some injuries may reflect healthy, active living..." I can guess but strongly urge this be clarified. The last sentence of the paragraph makes an assertion about the effectiveness of improved policy development, education and behavioural modification for family in preventing injury... and the further assumption that a high risk focus is desirable. These are assumptions unless there are studies to support them in which case these should be referenced. More broadly, however, the whole paragraph does not seem to logically fit... I suggest it either be deleted or perhaps moved to the Discussion. In our sentence, "While some minor injuries may reflect healthy, active living..." we are referring to the idea that minor bumps, bruises, abrasions and</p>

lacerations occur and are expected as a normal part of child development during activity. For example, a child who trips and cuts her knee on the soccer field while chasing the ball is an expected event as a child's coordination is only developing. This fall would not necessarily be considered preventable and reflects a child's exposure to healthy physical activities. Conversely, a child falling from the monkey bars and sustaining a head injury is harmful may be preventable with better playground equipment (grip material on bars, soft landing surface, lower height, etc.). This is the concept we are trying to explain in this sentence. We have changed it to, "While some minor injuries (scrapes and bruises) that occur during sporting activity may reflect healthy, active living, the vast majority...."

7. In the next para it is not evident what is meant by 'Exposures before and after migration etc. What sort of exposures do the authors have in mind?

We have added some examples including safety standards and cultural norms in the country of origin and housing standards after arrival.

8. The Objectives listed here are more specific than what is given in the Abstract although I wonder why the study is restricted to Ontario. Are similar datasets not available in other provinces? Might this introduce a bias? What surprises me is that the association is being tested to examine the hypothesis that risk would be lower among immigrants. There is nothing in the run up to this that explains why this, rather than the opposite, is what is being hypothesized.

The study is restricted to Ontario as similar datasets, both the immigration data linked to health administrative data as well as population-based emergency room data, is not available in other provinces. Approximately fifty percent of Canada's immigrants land in Ontario, with the vast majority settling in major urban centres. In reviewing Immigration, Refugees and Citizenship Canada's statistics on permanent residents in Canada (<http://www.cic.gc.ca/english/resources/statistics/facts2014/permanent/12.asp>), Ontario permits a similar proportion of immigrants from various regions of the world and immigrant classes as all of Canada (e.g. approximately 18-23% from Africa, 52-27% from Asia, 9-11% from South and Central America with approximately 9-12% refugees). Thus, these results would be generalizable to the rest of Canada.

We have added (as previously described) an explanation for our hypothesis that immigrants would have lower rates of injury compared with non-immigrants.

9. I was also surprised to see the terms exposure and outcome used in the context of a cross sectional study. Please explain.

Exposure refers to a group whose members have been exposed to a disease/state of health, or possess a characteristic that is a determinant of the health outcome of interest. It is synonymous with independent variable, factor, predictor variable, or explanatory variable. Similarly, outcome is synonymous with response variable, outcome variable, predicted variable. As these are synonyms and can be used interchangeably and are a matter of preference, we felt it appropriate to use exposure and outcome and have left it as such.

10. Other than this, I found the entire Methods section to be exemplary. (one typo: p. 5, line 56... "who have been granted the right") I am still uncertain whether the mv Poisson regression is appropriate in this situation. Related to this a question: if exposure is immigrant status why would main model include both immigrants and non-immigrants?

We have changed the typo. We have addressed the issue with Poisson regression above.

11. And, what possible explanation can there be for the difference in pattern among income and injury in ED visits vs hospitalizations or deaths (line 12, p.8) and the reversal of age related risks among immigrants? (line 27, p.8)

Our main interest in this study was injuries overall, rather than only 'serious' injuries (hospitalizations and deaths). This study did not explore specifically why these differences were observed. However, there are a number of possible explanations for the observed differences. There may be differences in the home environment (e.g. child safety gates at stairs, stove/oven safety practices (pot handles), secured dressers/shelves/televisions, etc.) or in the neighborhood (sidewalk cracks, playground equipment, etc.) that may lead to higher rates of injury, in particular in younger children. Injuries that may occur when these safety mechanisms are not in place (which may be relatively more common in immigrant families) more often result in more minor injuries (vs.

	<p>motor vehicle collisions, falls from significant height, high impact/energy collisions). There may also be differences in help seeking behaviour by income (higher income seeking more help) in immigrant populations. Some evidence from our group has previously shown higher income individuals are more likely to use the ED for low acuity problems (Saunders et al. J Peds 2016) or there may be fear by low income new immigrants of using the ED for minor injuries. Certainly, the reasons why these differences exist warrant further study.</p> <p>12. Towards the end of the discussion (p.9) the unexpected main findings are repeated but no explanation is offered. To say the findings 'demonstrate different causal pathways may exist' is not helpful without considerable elucidation. What might those pathways be? The healthy immigrant explanation is of some help but are there no data on the health status of these immigrants on arrival in Canada?</p> <p>We repeated our main finding in our conclusion so that it is highlighted. The explanations are provided in the fourth paragraph of the discussion where we talked about the healthy immigrant effect, selection policies as well as sociocultural factors, risk taking behaviours, etc. We have added more specifics (substance use) and clarified the piece about family supports to help explain these findings. We have limited Canadian data on the health outcomes of immigrant children and the healthy immigrant effect, though it has been demonstrated in other jurisdictions, in adults and in adolescents. We have added a reference for this.</p> <p>13. As well, I urge that references 25 and 41 (and perhaps 42-45 as well) be expanded so the reader has some idea of what may be driving the unexpected findings. What is written is too cryptic to be of use.</p> <p>For reference 25, we have added an example of behavioural differences (substance use). Reference 41 was removed as it was there erroneously. Instead, we have referenced and explained the Mendoza-Fuentes-Afflick Model and how familial and culturally derived positive health behaviours buffer the effect of poverty on health outcomes. We have also been more specific about different care seeking behaviours in immigrants that may explain observed differences.</p>
Reviewer 2	Tracy Blake
Institution	University of Calgary, Faculty of Kinesiology, Sport Injury Prevention Research Centre
General comments (author response in bold)	<p>Dear Authors:</p> <p>I enjoyed reading your manuscript entitled, "Unintentional injuries in children and youth from immigrant families in Ontario, Canada". I do have some concerns/comments related to framing its clinical applicability, the definition of your study population, discussion section, and handling of bias (selection bias particularly) and limitations. Please see the following comments.</p> <p>1. Page 4, Line 29: missing a comma between "occur" and "suggesting" Added. Thank you.</p> <p>2. Page 4, Line 29: replace "and" between "development" and "education" with ",as well as" Change made. Thank you.</p> <p>3. Page 4, Line 38/9: replace "Exposures" with "Factors", or be explicit about what kinds of exposures are being referenced. We have added examples as per Reviewer #1 Comment # 7.</p> <p>4. Page 4, Line 54/55: replace "test" with "examine" or "evaluate" Changed to examine. Thank you.</p> <p>5. Page 5, Line 37: remove "information, including" These words have been removed.</p> <p>6. Page 5, Line 39: make "injury related" "injury-related" (this actually occurs throughout) These have been edited.</p> <p>7. Page 6, Lines 26-31: Are deaths and injuries combined into one category? What is the rationale if they are combined (the clinical purpose/relevance of your study would come in handy to address this, I think)? Can an individual be counted multiple times? If they are, is it my visit (i.e., it is possible to have multiple visits for the same injury) or event (an injury with three visits is only counted once)? The discussion might benefit from examining how this might have influenced the results, if at all. For the descriptive results, we have separated ED visits, hospitalizations, and</p>

deaths as we wanted to capture the prevalence of each of these, in part, to understand injury epidemiology across both 'serious' and 'less serious' injuries. However, for the main model (our main objective) we included all injuries as we were interested in understanding risk for all unintentional injuries, no matter how serious. An individual can be counted multiple times as we were interested in the injury rates of the population, not the proportion of children ever being injured. Multiple visits for the same injury were not included if they occurred on the same day (e.g. if they went to the ED and were then admitted, only the hospitalization was counted). This was described on page 6 lines 31-35.

8. Page 6, Lines 39-45: I think the wording throughout the study needs to be careful, given this definition. Landed immigrant/Permanent Resident is a very specific group of immigrants. I think that this should be reflected in throughout the document—use children of permanent residents, for example, rather than children of immigrants. This data may not necessarily be reflective of, or generalizable to, immigrants who are not permanent residents, which is not discussed in the limitations. I also think mixing participants who were immigrants and first generation Canadians seems like a big assumption of similarities—by using consistent descriptions that indicate it is the family environment rather than the child's birth location that is of interest, this would automatically be clearer.

We feel using the terms immigrants and children of immigrants (or children from immigrant families) is appropriate as that is what these individuals are. Many temporary residents (though not all) are not covered by OHIP and therefore are not included in our cohort. This limitation is stated in our limitations section (lines 28 to 33). To clarify further, we have added, "These results may not be generalizable to temporary or undocumented residents". Throughout the manuscript we have, where possible, changed our terminology to "family immigrant status".

9. The definition also suggests the potential of selection bias that is not addressed by the authors. Where are all the other classifications of immigrants—excluded from the study, or included as non-immigrants? What about those who have undergone a change in immigration status (e.g., parents were landed immigrants in 1990, and became citizens after; parents who went straight from immigrant (non-PR) to citizen)? Are the same families included in both the immigrant and non-immigrant categories for different years in this case? Or would they have been removed from the dataset for the years following attaining naturalized citizenship, switched from immigrant to non-immigrant or do they remain classified by their first year of study eligibility throughout? **Immigrants are counted as such if they have a permanent resident/landed immigrant record. This includes those who were initially permanent residents and later acquired citizenship. If an individual ever had a permanent resident record, they were assigned to this group throughout the study and did not change categories. We have added "immigrants who landed in another province or foreign born Canadian citizens who subsequently moved to Ontario...." to our limitations about our misclassification bias.**

10. Page 6, Line 51 to Page 7, Line 7: Was the plan to evaluate covariates as confounders, modifiers or both? Be explicit.

These were evaluated as covariates and are labeled as such.

11. Page 7, Lines 12-14: I would be consistent about whether you use independent/dependent variables, or exposure/outcome variables with respect to terminology.

Thank you. We have changed "independent" to "exposure".

12. Page 7, Line 57: Hyphen is missing between "injury" and "related" (i.e., should be "injury-related").

Added.

13. Page 8, Line 38: missing hyphen between "cause" and "specific" i.e., should be "cause-specific")

Added.

14. Page 8, Line 50 to Page 9, Line 5: if this is the only mention of this relationship, it is not nearly enough.

This is also mentioned in the third paragraph of the results and we have now added this relationship to Table 3 for visual purposes. Our entire second paragraph of our discussion frames this result in the context of existing literature. The fourth paragraph of our discussion offers possible explanations for the lower injury rates among immigrants. We again mention this relationship in our conclusions. Perhaps this reviewer could clarify for us where he/she would like to see more information added.

	<p>15. Page 9, Line 10-33: this entire section belongs in the introduction, as there is no tie back to the findings of this research. The formatting guide for CMAJ Open suggests the introduction be only 2 paragraphs with a statement of the aims whereas the discussion is where we are to put our findings into context. This is how we have laid out our manuscript. We have left this paragraph as is and should the editors wish for us to move it to the introduction, we could re-organize this. Currently we have left it as is as this comment is different from our understanding of what CMAJ Open expects.</p> <p>16. Page 9, Lines 35-37: "The associations with high injury risk and low socioeconomic status and adolescent age are well established in general populations of both Canadian and other children." Does this mean Canadian and non-Canadian children living in Canada? Or children in Canada and children in other countries? This means children also living in other countries. We have added this.</p> <p>17. Page 9, Line 37: missing hyphen between "well" and "established" (i.e., "well-established"). Added.</p> <p>18. Page 9, Line 46: missing hyphen between "foreign" and "born" (i.e., "foreign-born") Added.</p> <p>19. Page 9, Line 44-49: "Only one other study testing the association of socioeconomic status and injuries in immigrant children has been published. They report within foreign born children in Sweden, the risk of hospitalization and death due to unintentional injuries is higher in children with the lowest parental education compared to those with the highest parental education." Again, this statement isn't tied back to the results in any real way, so should be in the introduction, particularly as the link between parental education and socioeconomic status have not been established at any point prior in the manuscript. As described above, we have put our results into context in the discussion, rather than the introduction as outlined by CMAJ Open. Parental education is a domain of socioeconomic status (SES) and the point of this line is to say that low SES in immigrants has been demonstrated to be associated with unintentional injuries. In our study, SES, as measured by the neighbourhood income domain was associated with an opposite effect of what has previously been reported.</p> <p>20. Page 9, Line 53: I would use "target", rather than "select" in this instance. We have changed to "target".</p> <p>21. Page 10, Line 16-35: there is no mention of the selection bias or external validity issues associated with the definition of "immigrant". I really think this needs to be addressed. In general, there is no discussion in this section of how the limitations provided impact the results or their interpretation, which I think needs to be included. I also think the decision to collapse immigrants and first-generation Canadians needs to be addressed more explicitly. Similarly, this is limited by the detail in the data collected. While this research does give some indication of mechanism, it doesn't provide enough information in and of itself to inform future practice. Finally, there is no mention of the limitations associated with the source materials. You can only go as far as your data, so the inability to make more clinically applicable inferences related to specific injury mechanisms, for example, precludes the use of this study for the development of prevention interventions, rather than its strength now as proof that more work is warranted and needed. We have added to our limitations a discussion of generalizability (including temporary and undocumented immigrants). We have also added documentation about data linkage rates for each database. We specified in our limitations that we underestimate all injuries by not capturing minor injuries where an interaction with the ED or hospital did not take place (i.e. minor injury at home or doctor's office). We have added in our "Predictors" description, "Maternal immigrant status was included to reflect outcomes related to the family unit/environment, rather than only to the child." The last point made by the reviewer highlights the importance and novelty of this work. In this study we were able to demonstrate that children from immigrant families have lower rates of injury, across all causes of injury. This has never before been reported and one of the first population-based papers a health outcome for immigrant children in Canada. We have definitely demonstrated that more work is needed and warranted with respect to development of prevention strategies for injuries and immigrants and this is a</p>
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	<p>first step in understanding injury risk in this population.</p> <p>22. Page 10, line 23: Hyphen missing between "care" and "seeking". Added.</p> <p>23. Page 10, Lines 40-42: I thought that Canadian born children whose parents were landed immigrants were counted in the immigrant category? If I am correct, then this sentence is inaccurate. We have clarified this wording to say "...those from non-immigrant families".</p>
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